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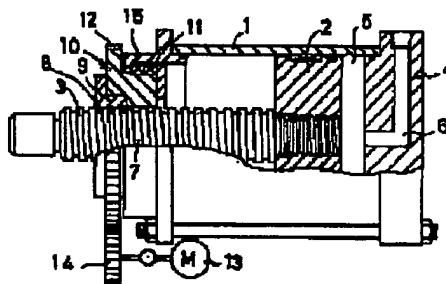
(54) **ELECTRIC-HYDRAULIC SERVO CYLINDER**

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(57) Abstract:

PURPOSE: To provide a high output electric-hydraulic servo cylinder capable of controlling a heavy load with accurate positioning accuracy just like a motor-operated cylinder.

CONSTITUTION: A screw groove 8 for a ball screw 7 is formed on a piston rod 3 moving in and out of a cylinder case, which is formed integrally with a piston 2 reciprocating in the cylinder case 1 by fluid pressure, and a rotary member 10 provided with a nut 9 for the ball screw and rotated by an electric motor 13, is provided on the cylinder case face on the side, of which the piston rod moves in and out. Thus, oil pressure supplements shortage of output of the electric motor, the electric motor and the ball screw 7 can control the speed and positioning with high accuracy and control a heavy load that cannot be driven by a motor-operated cylinder with higher accuracy than that of conventional hydraulic servo cylinder. This electric-hydraulic servo cylinder can be manufactured at relatively low cost.



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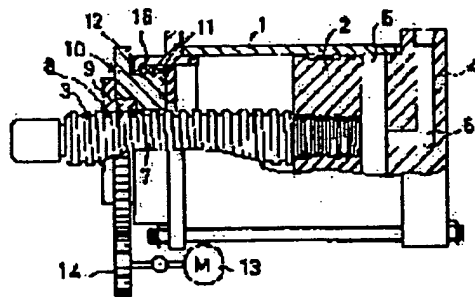
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CONSTITUTION: A screw groove 8 for a ball screw 7 is formed on a piston rod 3 moving in and out of a cylinder case, which is formed integrally with a piston 2 reciprocating in the cylinder case 1 by fluid pressure, and a rotary member 10 provided with a nut 9 for the ball screw and rotated by an electric motor 13, is provided on the cylinder case face on the side, of which the piston rod moves in and out. Thus, oil pressure supplements shortage of output of the electric motor, the electric motor and the ball screw 7 can control the speed and positioning with high accuracy and control a heavy load that cannot be driven by a motor-operated cylinder with higher accuracy than that of conventional hydraulic servo cylinder. This electric-hydraulic servo cylinder can be manufactured at relatively low cost.



LEGAL STATUS

[Operation] Although the operation which goes up after this press slide's downing and pressing a work in a work, when heavy loading like a press slide is connected to the piston rod of electric-oil pressure servo cylinder of this invention and a press operation is performed is performed Since it is a low load when a press slide downs, this piston rod pulls a piston by the ball thread driven with a motor. At the time of the heavy load in which a press slide presses a work It compensates with the piston which moves forward with the pressure-flow field which introduced the output insufficiency of a motor into ** by the side of the piston head, and it retreats at the time of retrocession, pushing a piston by the ball thread driven with a motor, and eliminating this indoor fluid on a tank, since it ends with a low load. Since it operates with both a motor and fluid pressure at the time of a heavy load, the shortage of an output by the motor can be compensated and the inaccuracy of the speed which is the fault of the piston which operates with a fluid, and a positional controller is compensated by the ball thread driven with a motor.

[0007]

[Example] If the example of electric-oil pressure servo cylinder of this invention is explained based on drawing 3, the piston at which a sign 1 reciprocates a cylinder case and 2 reciprocates the inside of this cylinder case 1 will be shown, and the piston rod 3 which haunts this piston 2 from the cylinder case 1 by this and one will be formed. The feeding and discarding of the pressure-flow field are carried out to ** 5 by the side of the piston head between the cylinder-head cover 4 of this cylinder case 1, and the piston 2 through the fluid circulation opening 6 prepared in this cylinder-head cover 4. The thread groove 8 of a ball thread 7 was formed in this piston rod 3, the rotation member 10 equipped with the nut 9 of this ball thread 7 was attached in the near cylinder case side where this piston rod 3 appears frequently free [rotation] by bearing 11, and it was made to engage with the gearing 14 which rotates the gearing 12 which formed at the peripheral surface of this rotation member 10 with the motor 13 in which roll controls, such as a servo motor formed in the side of this cylinder case 1, are possible. 15 is covering.

[0008] In order that electric-oil pressure servo cylinder of this invention may control heavy loading by high degree of accuracy, when it is used conveniently and it applies to a hydraulic press machine, as shown in drawing 4, it attaches a press slide 16 in a piston rod 3. And while connecting with a tank 18 through a prefill valve 17 at ** 5 by the side of the piston head, the regurgitation circuit 21 of the hydraulic pump 20 controlled by the electric-hydraulic control valve 19 which consists of an unloader is connected. The operation control of this electric - hydraulic control valve 19 is carried out by the controller 22, and this controller 22 carries out the operation control of this electric-hydraulic control valve 19, and controls the pressure of this regurgitation circuit 21 so that the pressure electrical signal 25 detected through the command electrical signal 23 and the pressure sensor 24 to input is in agreement. In order to detect the burden of this electric-oil pressure servo cylinder, the detection equipments 26, such as a load cell, are formed in a piston rod 3, and when the electrical signal detected now becomes more than the set point, a controller 22 makes a control operation perform to the electric - hydraulic control valve 19 which was being controlled to emit the fluid of the regurgitation circuit 21 to a tank 18 till then so that the regurgitation circuit 21 may be made into a set pressure. 27 is a work and 28 is the pilot circuit of a prefill valve 17.

[0009] A motor 13 is rotated, when dropping the press slide 16 which was carrying out the upper part position, if an operation of this example is explained. A press slide 16 is dropped, controlling a descending speed by controlling rotation of the rotation member 10 by this motor 13, since it is going to carry out natural fall with the self-weight. At this time, a fluid flows into ** 5 by the side of a piston rod from a tank 18 through a prefill valve 17. If a press slide 16 hits a work 27, the detection equipment 26 will detect this, and if the burden becomes larger than the proper controlling torque of a motor 13, an outputted part of the difference will be outputted with an oil hydraulic cylinder. That is, the command electrical signal 23 is inputted into a controller 22 according to the detecting signal from the detection equipment 26, and the pressure of the regurgitation circuit 21 and the pressure in ** 5 are controlled by the pressure according to this command electrical signal 23. Since the position of a press slide 16 is controlled by rotation of a ball thread 7, it can perform a precise control. After carrying out a pressure relief by the electric -